

1 Amendments to the Claims

- 2 1. (Currently Amended) A method for accessing a data storage device controlled by array
3 controller processes, the method including the steps of:
- 4 (a) receiving a file system access operation request;
- 5 (b) determining if the file system access operation request specifies an a file system
6 access operation comprising a divertible operation;
- 7 (c) if the file system access operation request specifies a divertible operation,
8 diverting the divertible operation from file system processes associated with the
9 data storage device to the array controller processes;
- 10 (d) performing the divertible operation with the array controller processes; and
- 11 (e) updating a file system data management arrangement with operation result
12 information from the array controller processes, the file system data management
13 arrangement being controlled by the file system processes.
- 14
- 15 2. (Original) The method of the Claim 1 wherein the operation comprises a create operation
16 and wherein the operation result information includes a reference to the array storage
17 space to which data for the file specified in the create operation is to be written.
- 18
- 19 3. (Original) The method of the Claim 2 wherein the step of updating the file system data
20 management arrangement includes causing the file system processes to produce an entry
21 in the file system data management arrangement which includes identifying information
22 for the specified data and a reference to the array storage space to which the specified data
23 is to be written.

1 4. (Original) The method of Claim 1 wherein the divertible operation comprises a read
2 operation and further including the step of reading an array storage space reference for the
3 file specified in the read operation.

4
5 5. (Original) The method of Claim 4 wherein:

- 6 (a) performing the divertible operation comprises reading data from blocks allocated
7 to the space identified by the array storage system space reference; and
8 (b) the operation result information includes an indication that the read operation is
9 complete.

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11 6. (Original) The method of Claim 5 wherein the step of the updating the file system data
12 management arrangement includes causing the file system processes to modify access
13 data in an entry for the file specified in the read operation.

14
15 7. (Original) The method of the Claim 1 wherein the step of the determining if the file
16 system access operation request includes a divertible operation is performed with a wedge
17 file system interposed between a file system client and the file system processes
18 associated with the data storage apparatus.

19
20 8. (Original) The method of Claim 7 wherein the step of determining if the file system
21 access operation request includes a divertible operation comprises reading a file attribute
22 for the file specified in the file system access operation request.

- 1 9. (Original) The method of Claim 7 wherein the step of the determining if the file system
2 access operation request includes a divertible operation comprises reading a file size
3 included in the file system access operation request.
4
- a 5 10. (Original) The method of Claim 1 further including the step of modifying the divertible
6 operation to a form suitable to be performed by the array controller processes.
7
- 8 11. (Original) The method of Claim 10 wherein the step of modifying the divertible operation
9 comprises converting the operation from a byte offset operation to a block access
10 operation.
11
- 12 12. (Original) The method of Claim 1 wherein the step of determining if the file system
13 access operation request includes a divertible operation is performed by the file system
14 processes.
15
- 16 13. (Original) The method of Claim 1 wherein the divertible operation comprises a write or a
17 create operation and the step of performing the divertible operation with the array
18 controller processes includes passing data for a file specified in the divertible operation
19 directly from a file system client to the array controller processes.
20
- 21 14. (Original) The method of Claim 1 wherein the divertible operation comprises a read
22 operation and the step of performing the divertible operation with the array controller

1 processes includes passing data for a file specified in the divertible operation directly
2 from the array controller processes to a file system client.

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4 15. (Currently Amended) A program product for servicing file system access operation
5 requests from a file system client, the program product stored on a computer readable
6 medium and including:

- a
- 7 (a) operation detection program code for detecting file system access operations
8 comprising divertible operations and file system access operations comprising
9 non-divertible operations in a received file system access operation request, and
10 for diverting divertible operations from file system processes associated with a
11 data storage device;
 - 12 (b) file system program code for implementing the file system processes and thereby
13 performing each non-divertible operation included in a received access operation
14 request and maintaining a file system data management arrangement which
15 includes information for each file in the file system; and
 - 16 (c) array controller program code for performing each divertible operation, managing
17 a data storage device including data storage media, and communicating with the
18 file system program code to update the file system data management arrangement
19 in response to the performance of a divertible operation.

20
21 16. (Original) The program product of Claim 15 wherein the operation detection program
22 code comprises wedge file system program code operable between a file system client
23 and the file system program code.

1 17. (Original) The program product of Claim 15 wherein the array controller program code
2 includes byte access conversion program code for converting byte offset access
3 instructions in a divertible operation to block access instructions.
4

5 18. (Original) The program product of Claim 15 wherein the operation detection program
6 code includes temporary data structure program code for creating a temporary data
7 structure containing information from the file system data management arrangement on a
8 file specified in a received access operation request.
9

10 19. (Original) The program product of Claim 15 wherein the operation detection program
11 code is incorporated into the file system program code.
12

13 20. (Original) The program product of Claim 15 wherein the array controller program code
14 includes file system formatting program code for formatting data messages according to a
15 file system standard for a file system implemented by the file system program code.
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17 21. (Currently Amended) A program product for servicing file system access operation
18 requests from a file system client to a file system including a file system data
19 management arrangement which contains information on each file in the file system, the
20 program product stored on a computer readable medium and including:
21 (a) operation detection program code for detecting file system access operations
22 comprising divertible operations in a file system access operation request received

1 from a file system client, and for preventing each divertible operation from being
2 performed by the file system; and

3 (b) array controller program code for performing each divertible operation, managing
4 a data storage device including data storage media, and communicating with the
5 file system program code to update the file system data management arrangement
6 in response to the performance of a divertible operation.

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8 22. (Original) The program product of Claim 21 wherein the operation detection program
9 code comprises wedge file system program code operable between a file system client
10 and the file system program code.

11
12 23. (Original) The program product of Claim 21 wherein the array controller program code
13 includes byte access conversion program code for converting byte offset access
14 instructions in a divertible operation to block access instructions.

15
16 24. (Original) The program product of Claim 21 wherein the operation detection program
17 code includes temporary data structure program code for creating a temporary data
18 structure containing information from the file system data management arrangement on a
19 file specified in a received access operation request.

20
21 25. (Original) The program product of Claim 21 wherein the array controller program code
22 includes file system formatting program code for formatting data messages according to a
23 file system standard for a file system implemented by the file system program code.

1 26. (Currently Amended) A data storage system comprising:

2 (a) a data storage device;

3 (b) data processing means for,

4 (i) determining whether a file system access operation request includes a file
5 system access operation comprising a divertible operation,

6 (ii) if the file system access operation request includes a divertible operation,
7 passing diverting the divertible operation from file system processes
8 associated with the data storage device to array controller processes
9 executed by the data processing means,

10 (iii) performing the divertible operation with the array controller processes, and

11 (iv) updating a file system data management arrangement with operation result
12 information for the divertible operation from the array controller
13 processes;

14 (c) an input/output arrangement connected to the data processing means for passing
15 communications between a file system client and the data processing means; and

16 (d) an interface between the data processing means and the data storage device.
17

18 27. (Original) The apparatus of Claim 26 wherein the data processing means comprises:

19 (a) an array controller executing the array controller processes; and

20 (b) a file system processor executing file system processes and maintaining the file
21 system data management arrangement.
22
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1 28. (Original) The apparatus of Claim 26 wherein the input/output arrangement includes:

2 (a) an input/output port having a physical input/output connection; and

3 (b) a network protocol stack component operatively connected to the input/output
4 port.

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6 29. (Original) The apparatus of Claim 28 wherein the network protocol stack component
7 provides network interface facilities for both the array controller and the file system
8 processor.

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